WHAT IS CLAIMED IS:

1. A method of revascularizing a portion of a patient's myocardium comprising:

positioning an active electrode surface in close proximity to a target site on a wall of the patient's heart; and

applying high frequency voltage between the active electrode surface and a return electrode to ablate tissue at the heart wall and to form a revascularizing channel through at least a portion of the heart wall.

2. The method of claim 1 further comprising axially translating the active electrode surface through a portion of the heart wall to form the revascularizing channel.

3. The method of claim 1 further comprising:

introducing at least a distal end of an electrosurgical catheter into the ventricle of the heart; and

positioning the distal end of the catheter in close proximity to the endocardium.

4. The method of claim 1 further comprising:

introducing at least a distal end of an electrosurgical probe through an opening in the patient's chest cavity; and

positioning the distal end of the probe in close proximity to the epicardium.

5. The method of claim 4 wherein the probe is introduced through an intercostal penetration in the patient.

6. The method of claim 1 wherein the voltage is applied continuously between the active and return electrodes.

7. The method of claim 1 wherein the voltage is applied in pulses to correspond to beating of the patient's heart.

8. The method of claim 1 wherein the active electrode comprises an electrode array including a plurality of isolated electrode terminals.

9. The method of claim 1 wherein the active electrode comprises a single electrode protruding from a distal end of an electrosurgical probe.

10. The method of claim 8 further including independently controlling current flow from at least two of the electrode terminals based on impedance between the electrode terminal and the return electrode.

11. The method of claim 1 further comprising forming a revascularizing channel with a lateral dimension of about 1.5 to 3.0 mm.

12. The method of claim 1 further comprising positioning a radially expandable lumenal prosthesis in the revascularizing channel to maintain patency of the channel.

13. The method of claim 1 wherein the channel formed by the active electrode surface is curved.

14. The method of claim 13 wherein the channel formed by the active electrode surface has first and second openings on one side of the heart wall, and a substantially U-shape therebetween.

15. The method of claim 8 wherein the electrode terminals are embedded in an insulating matrix to electrically isolate each terminal, the insulating matrix comprising an inorganic material.

16. The method of claim 8 wherein the return electrode is proximally recessed from the active electrode terminals.

17. The method of claim 8 wherein the return electrode and the active electrode terminals are disposed on a distal surface of an electrosurgical probe.

18. The method of claim 1 further comprising controlling the depth of the revascularizing channel.

19. The method of claim 18 further comprising visually marking the target site on the heart wall.

20. The method of claim 18 further comprising determining a thickness of the heart wall at the target site.

21. The method of claim 18 further comprising setting a predetermined distance through the heart wall at the target site and interrupting the flow of voltage to the active electrode surface when said active electrode surface has advanced the predetermined distance to control the depth of the channel.

22. The method of claim 20 wherein the determining step comprises measuring tissue impedance beyond the distal end of the active electrode surface.

23. The method of claim 1 further comprising the step of determining when the active electrode surface has substantially penetrated through the heart wall.

24. The method of claim 23 further comprising terminating the high frequency voltage before the active electrode surface pierces an opposite wall surface of the heart wall.

25. A method of transmyocardial revascularization of the heart of a patient comprising:

positioning a distal end of a probe in close proximity to a target site on a wall of the patient's heart; and

applying energy to the heart wall to ablate tissue at the heart wall while axially translating the distal end of the probe through at least a portion of the heart wall to form revascularizing channel through the heart wall.

26. The method of claim 25 wherein the probe is axially translated through at least a portion of the heart wall at a substantially constant rate.

27. The method of claim 25 further comprising means for automatically translating the probe through a substantial portion of the heart wall.

28. An electrosurgical device for transmyocardial revascularization of a patient's heart tissue, the device comprising:

an instrument shaft having a proximal and distal end portions, the distal end portion being sized for delivery through a small revascularizing channel in the patient's heart;

one or more active electrodes disposed on the distal end portion;

a return electrode disposed on the shaft close to the active electrodes; and

a connector disposed near the proximal end portion of the shaft for electrically coupling the active and return electrodes to a high frequency voltage source to ablate tissue at the heart wall and to form a revascularizing channel through at least a portion of the heart wall.

29. The device of claim 28 wherein the shaft is a catheter shaft configured for endoluminal delivery into the patient's ventricular cavity.

30. The device of claim 28 wherein the shaft is a probe shaft configured for intercostal delivery into the thoracic cavity.

31. The device of claim 29 further comprising an electrode array disposed at the distal end of the shaft and including a plurality of isolated electrode terminals, wherein current flow from at least two of the electrode terminals is independently controlled based on impedance between the electrode terminal and the return electrode.

32. The device of claim 28 wherein the maximum lateral dimension of the distal end portion of the shaft is less than about 1.0 mm.

33. The device of claim 28 wherein the maximum lateral dimension of the distal end portion of the shaft is less than about 2.0 mm.

34. The device of claim 28 wherein the electrode terminals are embedded in an insulating matrix to electrically isolate each terminal, the insulating matrix comprising an inorganic material.

35. The device of claim 28 wherein the return electrode is proximally recessed from the active electrode terminals.

36. The device of claim 28 wherein the return electrode and the active electrode terminals are disposed on a distal surface of the shaft.

37. The device of claim 28 further comprising an array of return electrodes on a distal surface of the shaft and having an opposite polarity from the active electrodes.

38. The device of claim 28 wherein the distal end of the shaft has a conical surface, the electrode terminals extending axially from the conical surface.

39. The device of claim 28 further comprising a guide catheter having a flexible steerable shaft for delivering the instrument shaft through a percutaneous penetration into the ventricular cavity.

40. The device of claim 28 further comprising a plurality of impedance monitors coupled to the electrode terminals for determining impedance between each individual electrode terminal and the return electrode.